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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/666,382	09/20/2000	Xiao-Dong Sun	RD-27,624	6126

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EXAMINER	
SODERQUIST, ARLEN	
ART UNIT	PAPER NUMBER
1743	

DATE MAILED: 09/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/666,382	SUN, XIAO-DONG	
	Examiner	Art Unit	
	Arlen Soderquist	1743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-6,9,10,13-20,23-30,33 and 34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4-6,9,10,13-20,23-30,33 and 34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 23, 2003 has been entered.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-2, 4-6, 9-10, 13-20 ,23-30 and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xiang (US 6,048,469) in view of Schultz (US 5,985,356) and Salomaa. In the patent Xiang teaches advanced phosphors discovered through combinatorially synthesizing candidates and then testing them for luminescence. Figure 2 shows a system for the synthesis of the candidate materials which is substantially similar to the instantly claimed device. The system has up to 8 inkjet heads connected with various chemical reservoirs used in making the various candidate compositions. Column 5, line 60 to column 6 line 12 describes the system including the substrate having wells and the motorized x-y stage that the support is attached to for the deposition part of the synthesis. Column 6, lines 13-22 teach using the system to produce libraries that are processed in different atmospheres at different temperatures to obtain different photoluminescent images by color photography under broad UV irradiation. When one looks at column 5, lines 5-15, the full understanding of this heat treatment and the inherent need for a

furnace to provide the heat treatment becomes totally clear. The patent differs from the instant claims in that the inkjet is not a positive displacement dispenser.

In the patent Schultz teaches the combinatorial synthesis of novel materials. Table 1 teaches that emission is one of the possible properties that can be examined for the materials that are synthesized. Column 20, line 18 through column 24, line 53 discuss the formation of these materials through delivery of them to a substrate by a dispenser. Column 20 lines 19-29 teach that dispensers can be utilized to generate diverse combinations of reactant components in the form of droplets or powder on a single substrate. Particularly relevant is that commercially available micropipetting apparatus can be adapted to dispense droplet volumes of 5 nanoliters or smaller from a capillary. Such droplets can fit within a reaction region having a diameter of 300 μm or less when a non-wetting mask is employed. In some embodiments, the micropipette is accurately and precisely positioned above the reaction, as described in the specification, before the reactant solution is deposited. Also taught is the use of multiple dispensers. In column 22, lines 17-37 the manner in which the dispenser(s) can dispense the components is explained using an inkjet dispenser as an example of a preferred dispenser.

In the patent Salomaa teaches a liquid handling system for performing automatic transfer of liquid samples between a plurality of receptacles. More specifically, it is directed to a system for filling, or transferring liquid samples between, a multiplicity of separate liquid receptacles, such as is required in initial filling and serial dilution of liquid samples in microtiter trays where each receptacle holds only about one tenth to ten milliliters of liquid. Such a serial dilution system basically involves mixing the sample with successively increasing proportions of a diluent in separate receptacles thereby to obtain a series of successively decreasing concentrations of the sample. The various sample concentrations can then be assayed to determine a particular property. The figures show the microtiter plate on a table (10) that is movable to place the microtiter plate under the positive displacement dispensers (36) which as shown in figure 3 have a plunger rod (40) for each dispenser.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a commercially available dispenser(s) such as that of Salomaa into the Xiang device because of their known use in creating gradients of compositions as taught by Salomaa and because of the recognition by Schultz that commercially available dispensers are

capable of dispensing components for creating materials that are subsequently evaluated for properties such as luminescence (emission).

4. Claims 1-2, 4-6, 9-10, 13-20 ,23-30 and 33-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Xiang (US 6,048,469) in view of Schultz (US 5,985,356), Jorgensen and Stahli . In the patent Xiang teaches advanced phosphors discovered through combinatorially synthesizing candidates and then testing them for luminescence. Figure 2 shows a system for the synthesis of the candidate materials which is substantially similar to the instantly claimed device. The system has up to 8 inkjet heads connected with various chemical reservoirs used in making the various candidate compositions. Column 5, line 60 to column 6 line 12 describes the system including the substrate having wells and the motorized x-y stage that the support is attached to for the deposition part of the synthesis. Column 6, lines 13-22 teach using the system to produce libraries that are processed in different atmospheres at different temperatures to obtain different photoluminescent images by color photography under broad UV irradiation. When one looks at column 5, lines 5-15, the full understanding of this heat treatment and the inherent need for a furnace to provide the heat treatment becomes totally clear. The patent differs from the instant claims in that the inkjet is not a positive displacement dispenser.

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In the paper Jorgensen discusses fully automated membrane dispensing in nanoliter scale and its application in sensor manufacturing. The rising degree of miniaturization in sensor technology and the efforts to make industrial use of it require an adequate solution for coating of sensors with membranes needed for various applications. A fully automated dispensing device was developed which is capable of dispensing droplets in nanoliter range with high accuracy and reproducibility. The device combines a three axles positioning system with a pattern recognition system and a dispensing valve and is suited for industrial mass production of sensors (page 207). Up to 150 droplets per minute are possible. Positioning accuracy is below three micrometer and standard deviation of the dispensing process is 2% or lower. The reproducibility of the process is independent from properties of the medium to be dispensed such as viscosity or solvent and shows no dependence on dispensing parameters such as needle diameter or dispensing time. The measurement of dissolved oxygen in a liquid solution serves as application example to show the practical suitability of the dispensing device.

In the patent Stahli presents an automatic pipettor utilizing a syringe having several openings at its end. A different tubing segment connects with each of these openings and extends into different vials of liquids. Of these vials, one contains a buffer solution generally used in appreciably greater quantities than the others. Another vial receives the liquids from the syringe. As a stepping motor partially withdraws the piston from the syringe, a tube leading to a vial with unmeasured liquid is open. When the stepping motor reinserts the plunger into to the syringe, the tube leading to the receiving vial becomes open while the other tubes remain closed. The tubing segments extending between the syringe and the vials include three sections. The section closest to the syringe, formed from polyimide, undergoes a minimal change in its volume notwithstanding the negative and positive partial pressures exerted by the piston. The second section, having a plasticized polyvinyl chloride construction, has greater flexibility than the polyimide portion. Pinching off this flexible section from the outside provides a valving device for the system. The last section of the tubing consists of stainless steel and runs into the vial to provide a high degree of rigidity. Coating the inside with dimethyldichlorosilane reduces its rusting and cross-contamination between pipetted liquid. In operating the pipettor, the buffer should follow the other liquids placed into a single container. This washes the syringe between samples and avoids carry-over error from one sample to the next. After expelling fluid from the

syringe, the stepping motor moves at least one step in the direction of withdrawing the piston but with the outlet open. This removes the slack in the coupling between the motor and the piston and increases the accuracy in the volume of sample drawn into the syringe. The pipettor, when called upon to deliver a microliter of a particular liquid, will deliver from 0.98 to 1.02 microliters at least 90 per cent of the time. Column 10 discusses how the stepper motor is operated and teaches that for 20 steps of rotation, the apparatus moves 1 microliter of fluid (the device is capable of moving less that one microliter of fluid). Column 13, lines 1-34 teach the use of computer control of the motor speed relative to sample size or viscosity. The section also teaches the versatility of the device in being automatically controllable to dispense one liquid; formulate a solution of several liquids; prepare several solutions; or take a liquid from one of the vials and place it in several others.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a commercially available dispenser(s) such as that of Stahli into the Xiang device because of their known use in formulating mixtures, preparing multiple solutions and handling viscose materials as taught by Stahli and Jorgensen and because of the recognition by Schultz that commercially available dispensers are capable of dispensing components for creating materials that are subsequently evaluated for properties such as luminescence (emission).

5. Applicant's arguments filed May 30, 2003 have been fully considered but they are not persuasive for the reasons of record and the following comments. Relative to the definition of "linear dynamic range" page 6, line 9 of the instant specification is talking about the verticle displacement of the syringes. If one looks at lines 15-20 of page 6, it is clear that the instant invention uses a stepping motor to control the volume of solution. Thus the instant invention uses discrete volume steps to make the differnet volumes that are dispensed. As such it appears that applicant is not capable of dispensing volumes of any amount in the claimed range, but is limited to the volumes that can be produced by the discrete steps of the stepping motor. More importantly this is the same method that Stahli uses to dispense the volumes taught therein and "linear dynamic range" does not define over what is taught by the combination of references.

Relative to the combination of references, the primary Xiang reference is substantially similar to the instantly claimed apparatus and method in that it teaches combinatorial preparation

of luminescent materials for screening by forming mixtures of precursers that are subsequently processed to form materials that are screened for their luminescent properties. The major difference between Xiang and the instantly claimed device and method is the use of a positive displacement dispenser (syringe pump dispenser) to dispense the liquids used in forming the combinatorial mixtures. Thus the question becomes would one of ordinary skill in the art find motivation to replace the dispensers of Xiang with the required positive displacement dispensers. In answering this question, the analogous art clearly is not liomited to dispensers used to dispense liquids, solutions or suspensions of precursors used to make the luminescent materials as applicant appears to be arguing.

In this respect the Schultz reference clearly teaches combinatorial synthesis and screening of a variety of materials for a variety of properties that includes luminescent properties. The Schultz reference makes materials that are screened for a variety of properties showing that the intended use of the mixture made through the dispensing process has little if any relevance to the dispensing process and the dispenser used. The material are formed by forming mixtures of precursors that are dispensed to a substrate for subsequent processing. In the Schultz reference as in the Xiang reference the dispenser that is explained in the greatest detail is the inkjet type of dispenser. In addition to this Schultz teaches that commercially available micropipetting apparatus can be adapted to dispense drop volumes of 5 nanoliters or less from a capillary. This is a clear recognition and teacihng by one of skill in the art that commercially available micropipetting apparatus CAN BE ADAPTED TO DISPENSE volumes small enough to form volumes within the claimed range in the combinatorial synthesis process. These teachings of Schultz show that one of ordinary skill in the art would have known the possibility of using other types of commercially available dispensers. This further shows that one of ordinaru skill in the art has an expectation of succesfully modifying or adapting commercial micropipetting dispensers to dispense the nanoliter volumes required by the claims. In the case of the Salomaa reference a micropipetting device is taught which dispenses liquids to form mixtures having one or more components that vary in concentration within the mixture (solution). These mixtures are subsequently screened for a particular property. Even though Salomaa is not dealing with formation of solutions or mixtures of solid luminescent materials it is art that is relevant to the question of why would one of skill in the art replace a different type of liquid dispenser with a

positive displacement type of dispenser. In this case Salomaa shows that positive displacement micropipetting devices can form mixtures of varying composition of at least one component for use in screening a property of the composition. Furthermore the patent teaches using either a diluent or a reagent in making the various mixtures which shows that the device can be used to form a mixture of at least two components in which the relative concentration of the two components changes in the series of mixtures. In Salomaa is a device that is performing a substantially similar function (dispensing liquids to form a varying concentration of at least one component in a series of mixtures) for a similar purpose -- screening a property of the resultant mixture. This in combination with Schultz provides both the expectation and knowledge that the Salomaa device can be substituted for the inkjet device as a dispenser for forming mixtures. Jorgensen and Stahli show similar teachings and add that a positive displacement dispenser can dispense reproducible volumes independent of viscosity or solvent effects. From this it is clear that not all dispensers are capable of dispensing reproducible volumes as viscosity or solvent change. Thus Jorgensen and Stahli show that one of skill in the art would have recognized that not all dispensers are free of viscosity or effects on the dispensed volume, but an advantage of the positive displacement type of dispenser is the independence of the dispensed volume on the viscosity of the solution of the solvent used in the solution. this adds a further reason and clear motivation for replacing the inkjet type of dispenser of Xiang with the positive displacement type of dispenser as taught by Jorgensen or Stahli.

Relative to the viscosity in the claims, the cited Louderback and Tezuka references were not applied because they simply place the claimed "greater than about 1 centipoise" language in perspective to the inherent properties of blood and water. Since according to the Louderback reference water has a viscosity of 1.002 centipoises (0.01002 poises x 100 centipoises/poise), the instant claims include water as a liquid having the claimed viscosity. Thus Salomaa teaches a dispenser that clearly does not have problems dispensing liquids of greater than 1 centipoise and any arguments to that effect are clearly not relevent to the claims since water is a liquid having the required viscosity. Thus there is no need to incorporate the Louderback or Tezuka references into the rejections of record because the viscosity of the aqueous materials in the references all inherently exceed the required minumum viscosity!

Relative to the particle suspension of claim 24, Schultz clearly teaches dispensing particle suspensions as part of the mixture to form the variaous materials, therefore determination of proper particle size would have been an optimization issue or an issue clearly covered by the particle suspensions (whole blood) dispensed in the other applied references. For these reasons applicant's arguments are unpersuasive.

6. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arlen Soderquist whose telephone number is (703) 308-3989. The examiner's schedule is variable between the hours of about 5:30 AM to about 5:00 PM on Monday through Thursday and alternate Fridays.

For communication by fax to the organization where this application or proceeding is assigned, (703) 305-7719 may be used for official, unofficial or draft papers. When using this number a call to alert the examiner would be appreciated. Numbers for faxing official papers are 703-872-9310 (before finals), 703-872-9311 (after-final), 703-305-7718, 703-305-5408 and 703-305-5433. The above fax numbers will generally allow the papers to be forwarded to the examiner in a timely manner.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Arlen Soderquist September 22, 2003
ARLEN SODERQUIST
PRIMARY EXAMINER